OPERATIONAL RISK MANAGEMENT

Advanced Training

Advanced Training

* In-depth ORM Process
* In-depth Hazard Analysis Too
* Implementation Concepts
* Implementation Suggestions & Examples
* Aviation ORM Implementatio Plan

Operational Risk Management

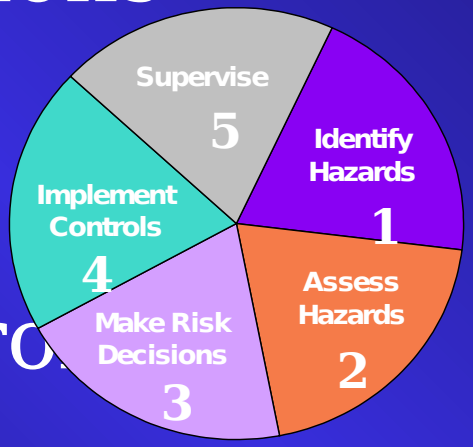
Levels of Application

1. Time-critical - On the run consideration of the 5 steps
2. Deliberate - Application of the Complete 5-Step Process
3. **In-Depth - Complete 5-Step Process With Detailed Analysis**

ORM Process

In-depth ORM

1. **Identify Hazards**
   - **A. Operational Analysis**
   - **B. Preliminary Hazard Analysis**
2. **Assess Hazards**
3. Make Risk Decisions
   - A. Control options
   - B. Risk vs. Benefit
   - C. Communicate
4. Implement Control
5. Supervise



ORM / TQL Comparison

- ORM
  - Team established till event is over or effective risk controls implemented
  - Can be done alone
  - Process not Program
  - Detect Hazards
  - Manage Risks
  - Reduce Risk
- TQL
  - QMB established till process goes away
  - Always uses Team concept
  - Continuous process Improvement
  - Detect defects
  - Manage processes
  - Reduce Variation

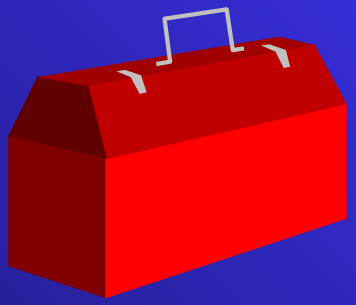
ORM / TQL Comparison

- ORM
  - Control what we do
  - Event Improvement
  - Quantitative or Qualitative Analysis
  - Indoc = 1 Hour
- TQL
  - Measure and improve what we do
  - Process Improvement Cycle
  - Quantitative Analysis using statistical approach
  - Intro = 4 Days

ORM / TQL Summary

- ORM
  - Operational focus
  - Deals specifically with Hazards and Risk Management
  - Controls mitigate risk
- TQL
  - System focus
  - Continuous improvement of all significant processes (Reduce variation)
  - Changes improve the processes

In-depth Hazard Analysis



1. General
2. Complex Operations
3. Physical Movement/Positio

In-depth Hazard Analysis Tools

1. General:

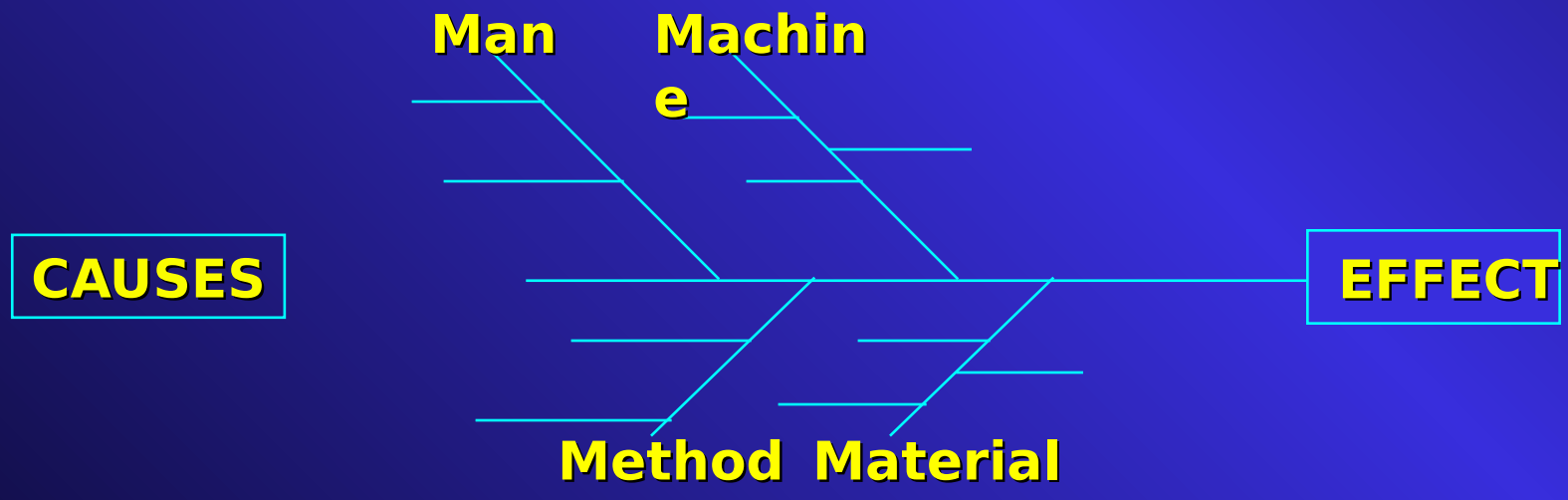
a. Analysis of Data
b. Cause and Effect Diagram
c. Tree Diagrams
d. Surveys

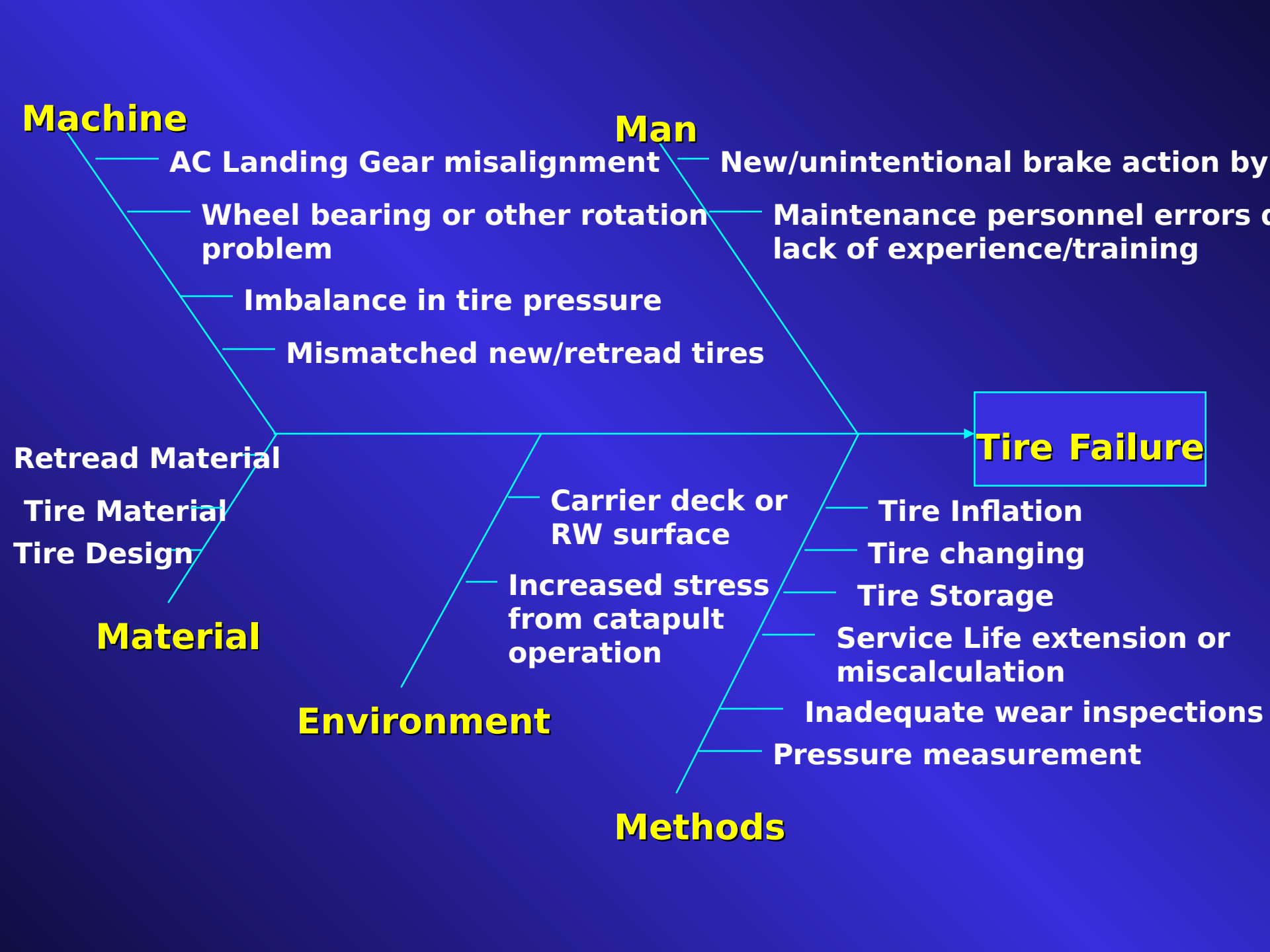
a. Analysis of Data

- Technique takes advantage of lessons learned or other historical data bases to ensure hazards which have been previously recorded are identified.
- Application: PHA & Hazard Assessment for any operation or process that has been previously accomplished and reported on.
- Method:
  - Obtain data on applicable steps
  - Review data for hazard information

b. Cause and Effect Diagram

- Illustrates relationships between a given effect and its possible causes.
- Application: General PHA
- Method:
  - Identify problem (hazard/effect)
  - Define major categories of possible causes
  - Identify causes/root causes within each category

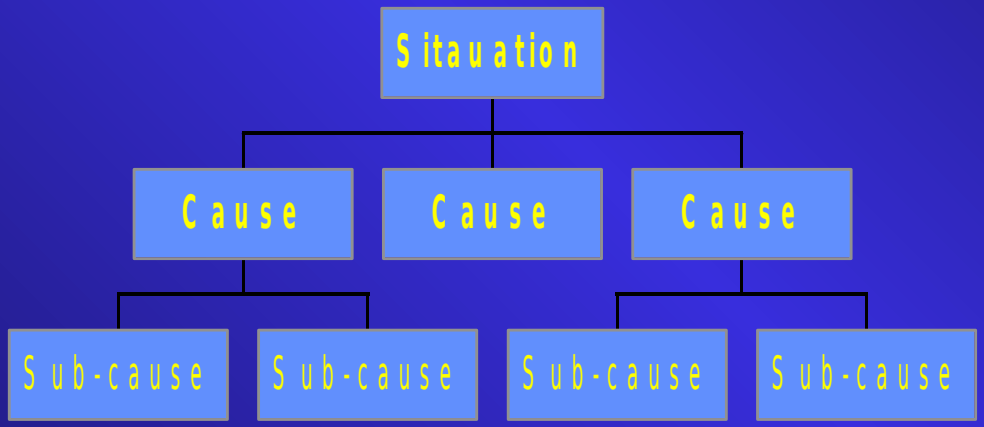



Machine
AC Landing Gear misalignment
Wheel bearing or other rotation problem
Imbalance in tire pressure
Mismatched new/retread tires
Man
New/unintentional brake action by
Maintenance personnel errors d
lack of experience/training
Tire Failure
Retread Material
Tire Material
Tire Design
Material
Carrier deck or RW surface
Increased stress from catapult operation
Environment
Tire Inflation
Tire changing
Tire Storage
Service Life extension or miscalculation
Inadequate wear inspections
Pressure measurement
Methods

c. Tree Diagram

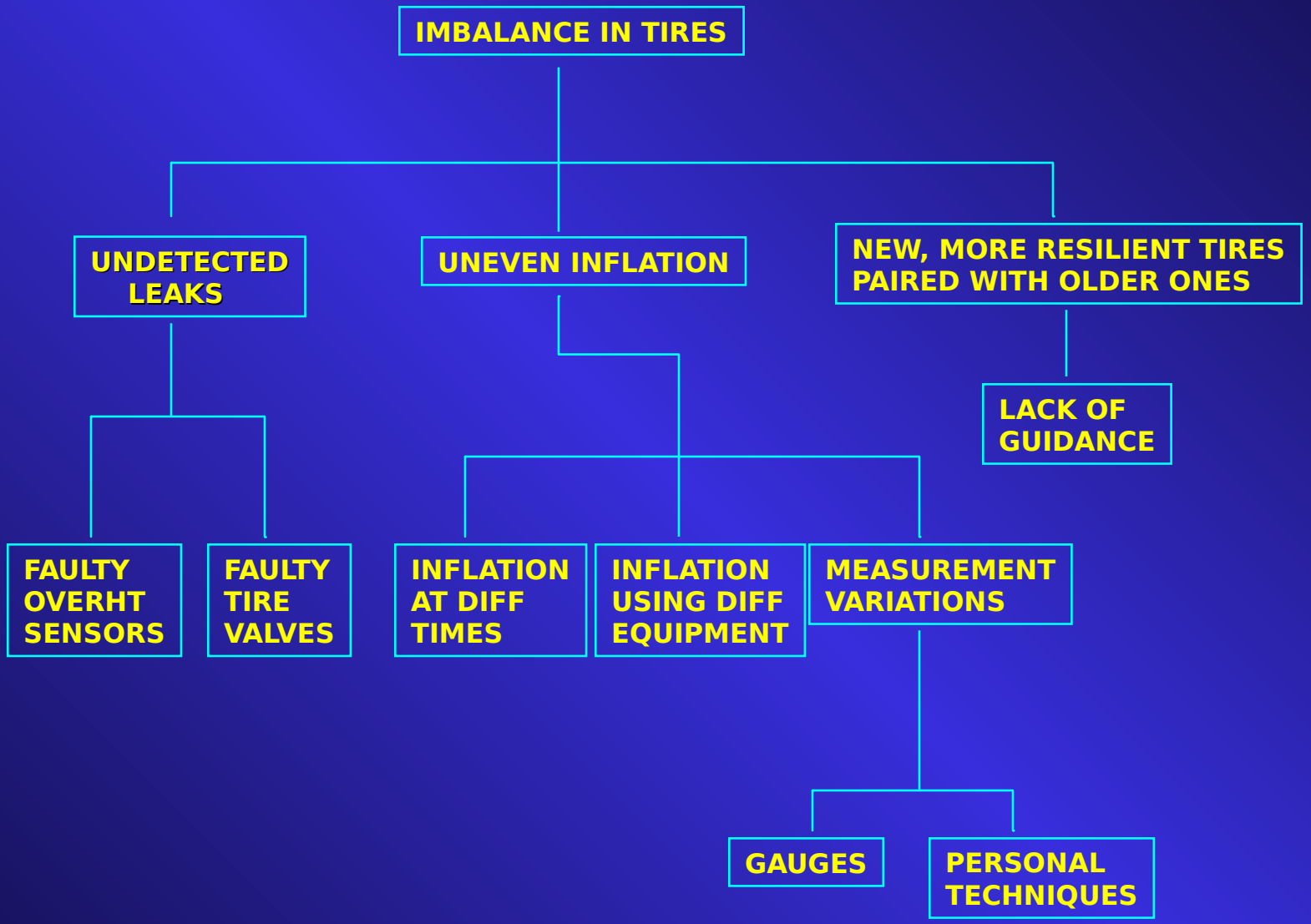
- Similar to “cause & effect” diagram, but less structured
- Applications: General PHA
  - Positive
  - Negative

- Event



Tree Diagram
(Cont.)

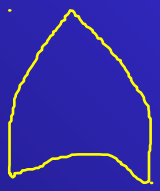
- Method:
  - Positive or Negative tree
    - Identify event
    - Identify primary causes on first level
    - Identify sub-causes on subsequent levels
  - Event tree
    - Same procedure with outcomes or results rather than causes


IMBALANCE IN TIRES
UNDETECTED LEAKS
UNEVEN INFLATION
NEW, MORE RESILIENT TIRES PAIRED WITH OLDER ONES
LACK OF GUIDANCE
FAULTY OVERHT SENSORS
FAULTY TIRE VALVES
INFLATION AT DIFF TIMES
INFLATION USING DIFF EQUIPMENT
MEASUREMENT VARIATIONS
GAUGES
PERSONAL TECHNIQUES

Tree Diagram
Fault Tree Analysis

- More rigorous application of positive or negative tree diagram using symbols to connect the causes

AND



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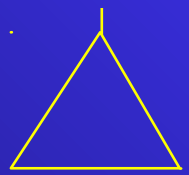
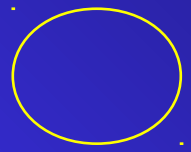


TRANSFER

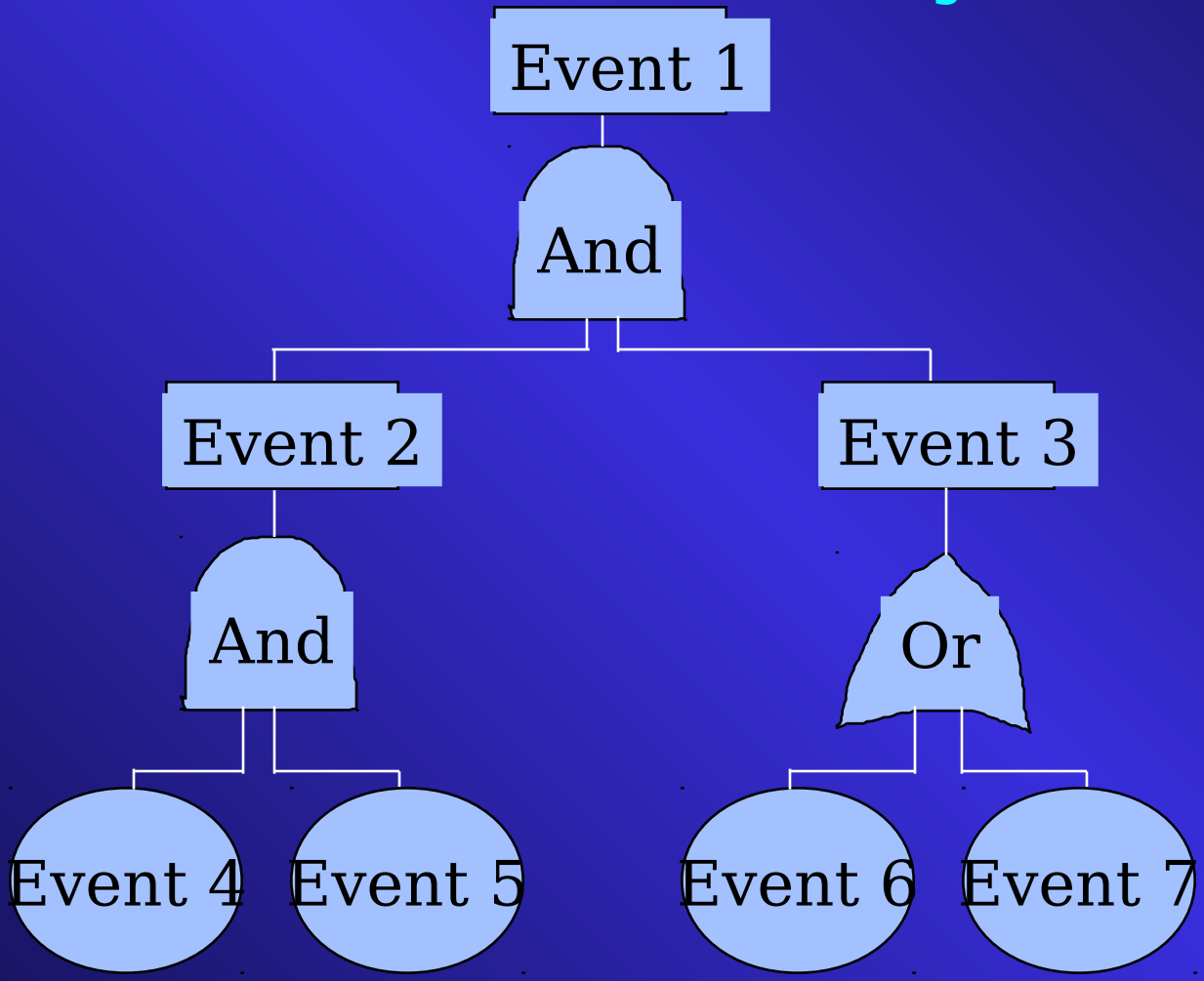
OUTPUT EVENT



BASIC EVENT

Tree Diagram

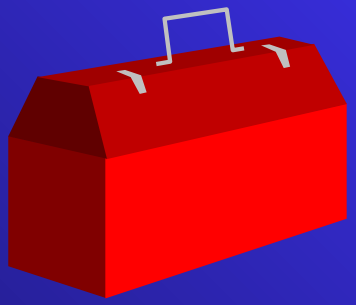
Fault Tree Analysis (Cont.)



d. Surveys

- Technique which obtains hazard information from a cross-section of personnel who participate in or are knowledgeable about the operation/process being analyzed.
- Application: General PHA & Hazard Assess
- Method:
  - Design to test knowledge or obtain perspective of person surveyed
  - Distribute to adequate sample size

In-depth Hazard Analysis



1. General

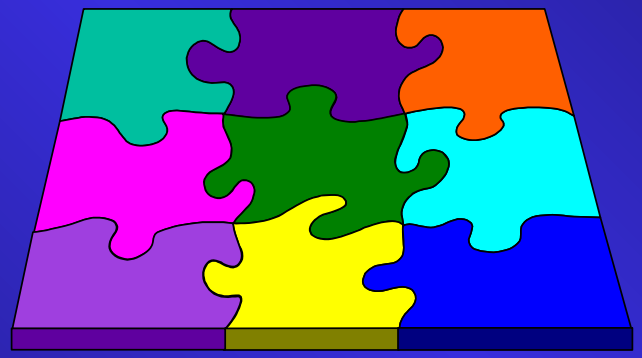
2. Complex Operations

3. Physical Movement/Positio

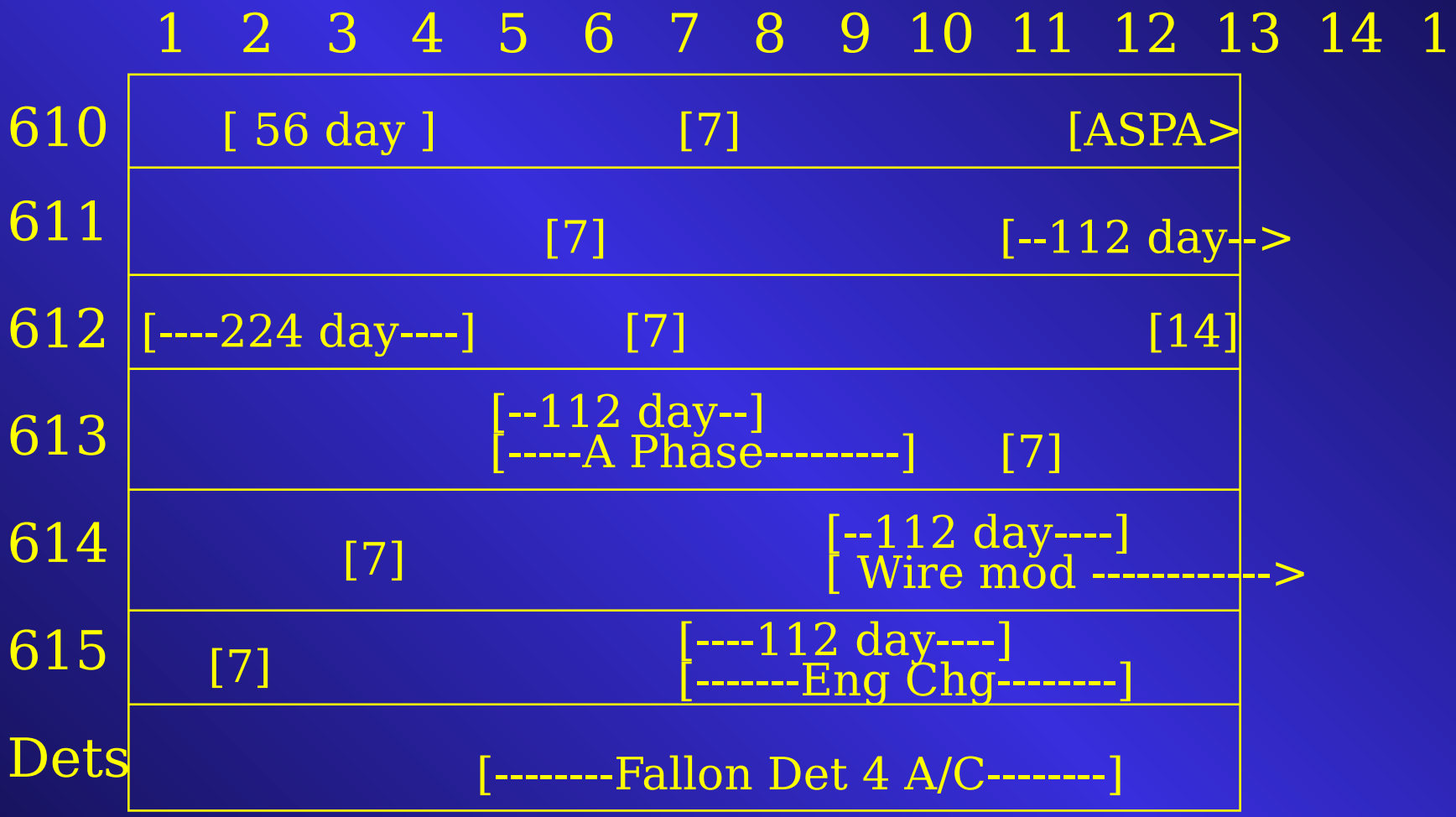
In-depth Hazard Analysis Tools

2. Complex Operations:

a. Simultaneously Timed Events Plot
b. Failure Mode & Effects Analysis
c. Interface Analysis



a. STEP


1 2 3 4 5 6 7 8 9 10 11 12 13 14 1
610
[56 day]
[7]
[ASPA>
611
[7]
[--112 day-->
612
[----224 day----]
[7]
[14]
613
[--112 day--]
[-----A Phase---------]
[7]
614
[7]
[--112 day----]
[Wire mod ---------->
615
[7]
[----112 day----]
[-------Eng Chg--------]
Dets
[--------Fallon Det 4 A/C--------]

b. Failure Mode & Effects Analysis

- Technique designed to focus on key elements of a system, their possible failures and effects on the rest of the system.
- Applications: PHA & Hazard Assessment
  - Equipment systems
  - Complex operations
- Methodology- for each key element:
  - How can it fail?
  - What will be the results of the failure?

Failure Mode and Effects Analysis

Component	Failure Mode	Effects on Other Comp.	Effects on System or O
Finish 224-day insp on 612 by the 5th	Support equip down	Delay in 616's engine chg or 614's wire mod to provide A/C for Fallon Det	Increased workload Waiver request Disrupts long-term schedule for wire mods on other A/C
	Unscheduled maint required; insp item out of tolerance		
	Landing Gear Emergency Op Check problem		

c. Interface Analysis

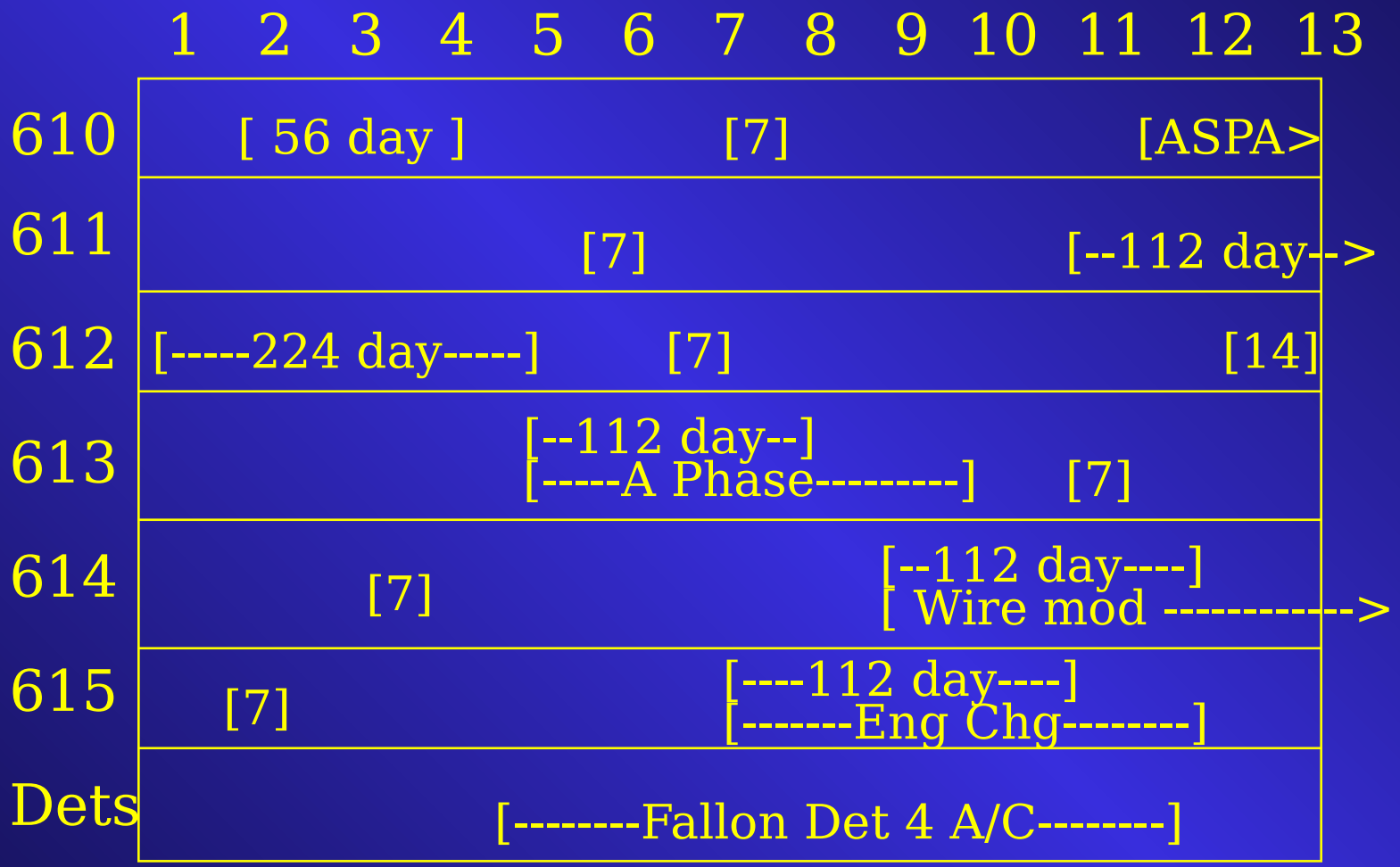
- Technique to examine the potential adverse interaction between two or more activities.
- Applications: PHA & Hazard Assessment
  - Planning new facility or modification
  - Planning complex operation or one in new environment
- Methodology:
  - Identify activities which might interact
  - Evaluate consequences of potential interactions

Interface Analysis
(Cont.)

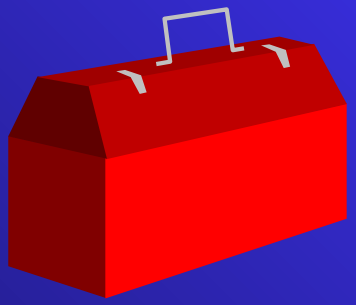
Interface Characteristics to Consider

- Energy
- Personnel
- Equipment
- Material
- Information
- Bio-material

Interface Analysis with STEP



In-depth Hazard Analysis



1. General
2. Complex Operations
3. **Physical Movement/Posi**

In-depth Hazard Analysis Tools

3. Physical Position/Movemen

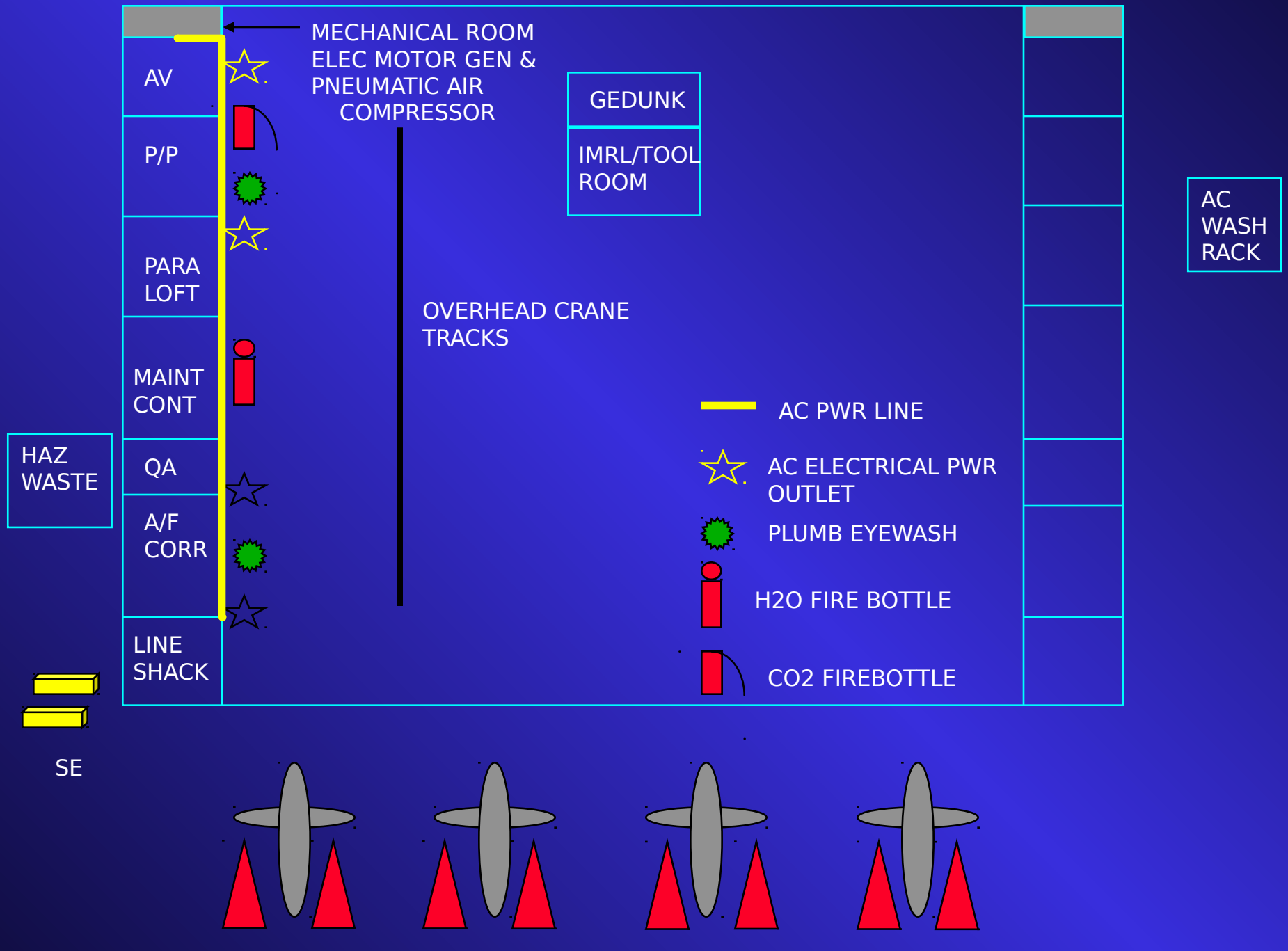
a. Mapping
b. Energy Trace & Barrier Analys
c. Interface Analysis

a. Mapping

- Technique depicts hazards and key components in physical context on a map, chart or diagram.

- Applications: PHA for Physical movement/ position situation

- Method:
  - Depict components/activities in their physical context
  - Identify hazards and assess their impact using the relative location of


MECHANICAL ROOM
ELEC MOTOR GEN &
PNEUMATIC AIR
COMPRESSOR
GEDUNK
IMRL/TOOL
ROOM
AV
P/P
PARA
LOFT
MAINT
CONT
QA
A/F
CORR
LINE
SHACK
OVERHEAD CRANE
TRACKS
HAZ
WASTE
AC
WASH
RACK
AC PWR LINE
AC ELECTRICAL PWR
OUTLET
PLUMB EYEWASH
H2O FIRE BOTTLE
CO2 FIREBOTTLE
SE

Energy Trace & Barrier Analysis

- Technique designed to detect hazards arising from “energy sources”.
- Applications: PHA & Hazard Assessment for physical movement/position situations
- Methodology:
  - Identify Energy sources
  - Trace Energy flow
  - Examine Barriers for potential failure modes
  - Note unplanned release sources or potential barrier failures as hazards.

Energy Trace & Barrier An

Types of energy to consider:

Electrical

Exhaust

Vibration

Noise

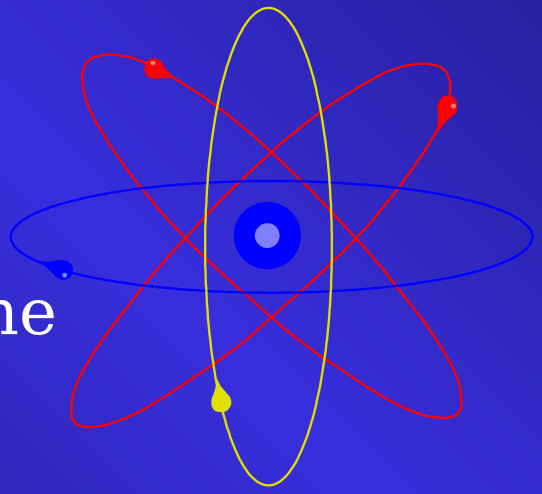
Mechanical

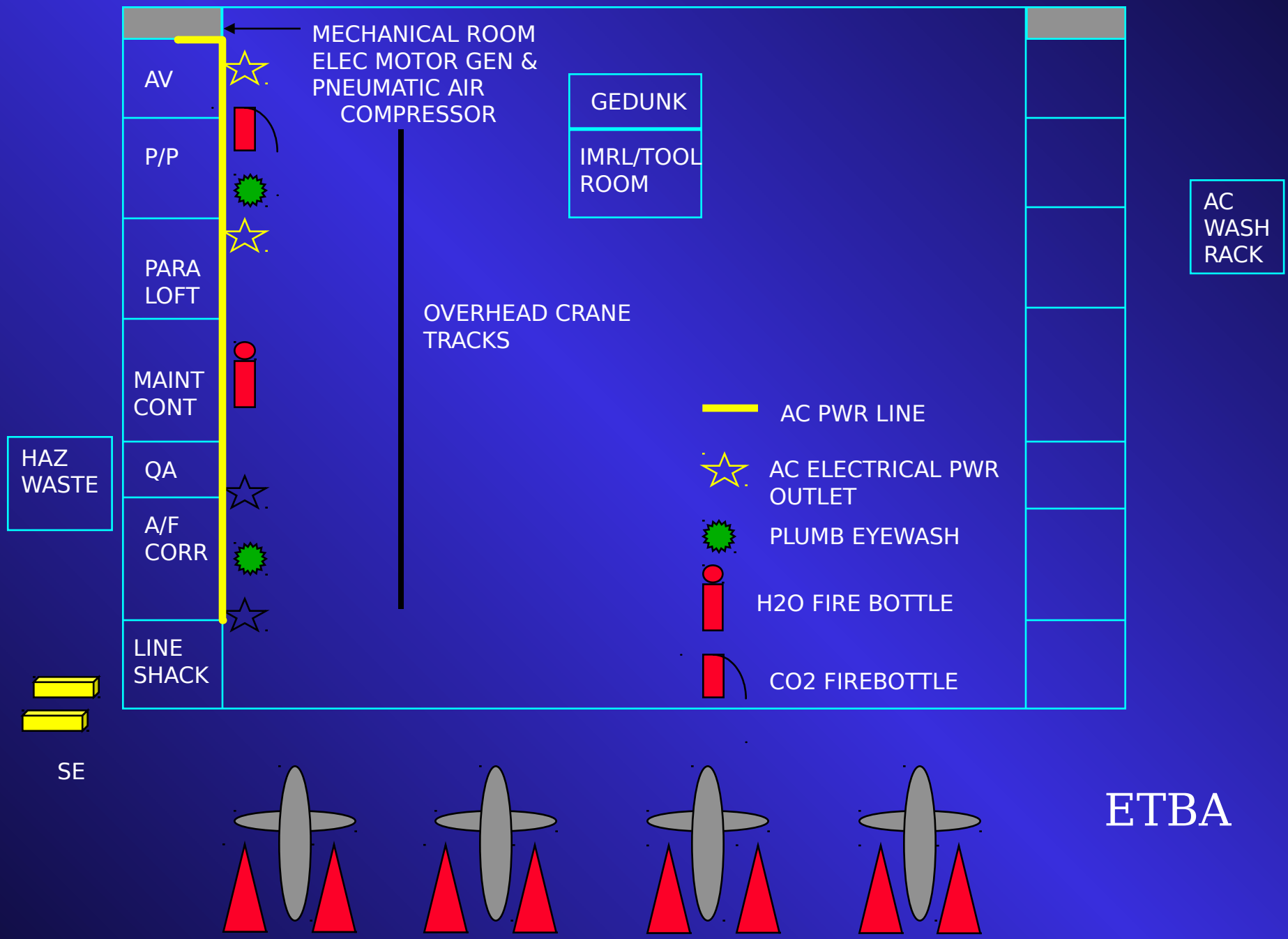
Radiation

Thermal

Chemical

Pressure/Volume

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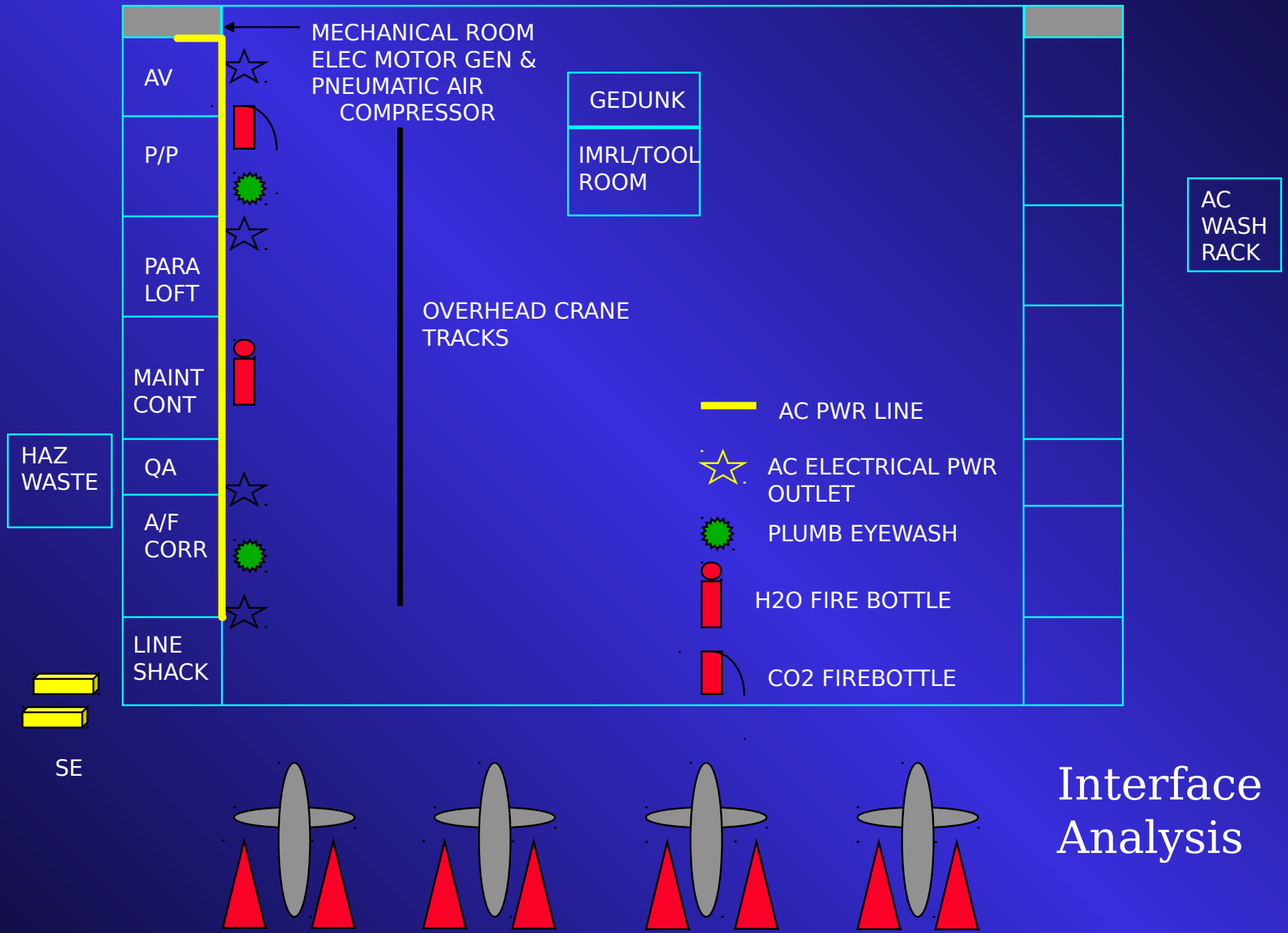
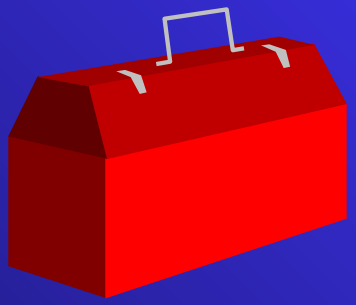


Interface Analysis

In-depth Hazard Analysis



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Operational Risk Management Process

In-Depth

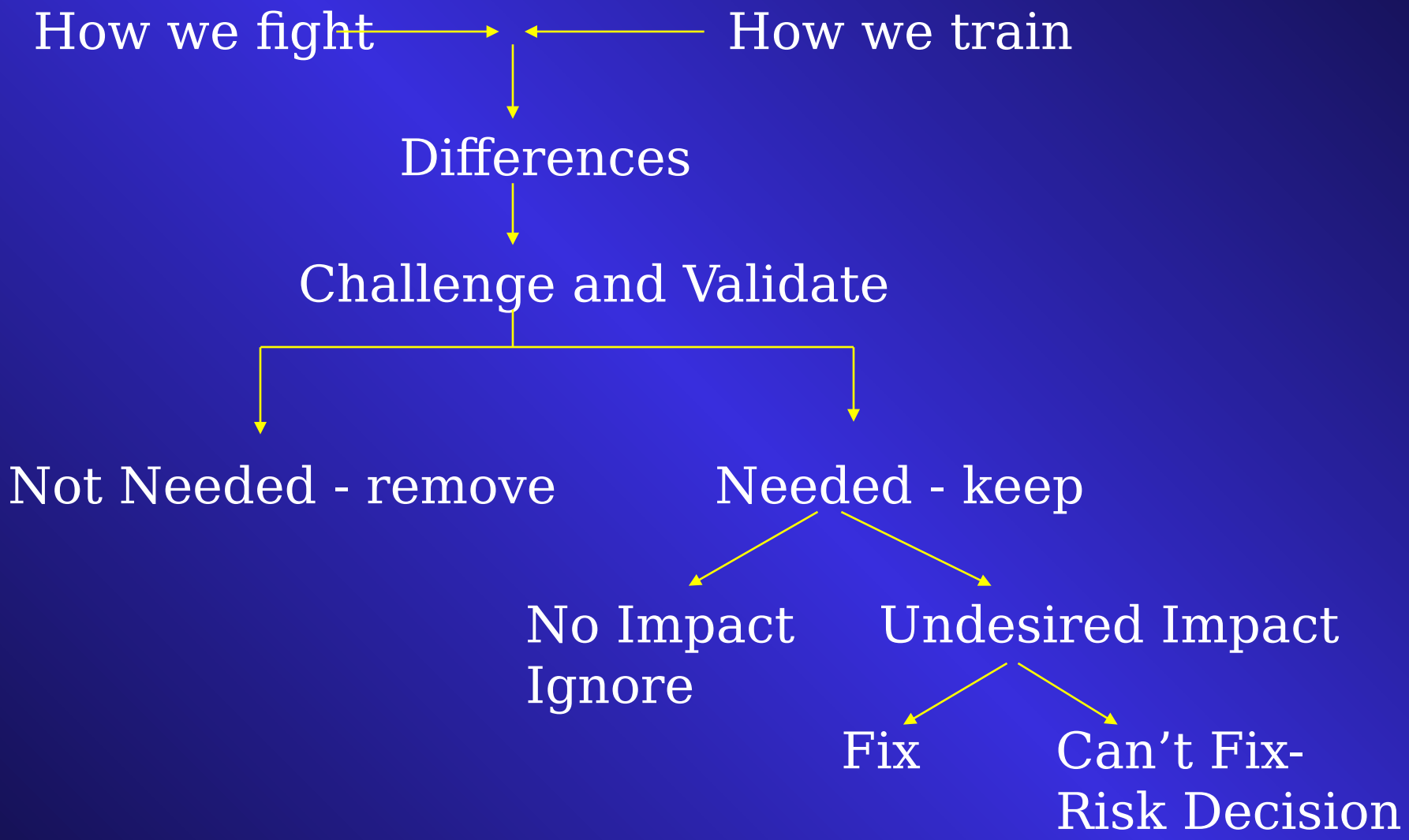
1. Identify Hazards
2. Assess Hazards
3. **Make Risk Decisions**
4. Implement Controls
5. Supervise

Training Realism Assessment

- Technique used to identify and select optimum risk controls which do not unnecessarily inhibit training realism.
- Applications: Evaluate risk controls used in military training procedures.
- Methodology: for each risk control
  - Is it consistent with actual combat procedures?
  - If not, challenge and validate
  - Minimize undesired impact of valid non-combat controls and identify as “training only”

Training Realism Assess

(Cont.)



Training Realism Assess

Example - Air to Air

How we fight → ← How we train

Artificial hard deck

Challenge and Validate

Needed - yes

Undesired impact - unable to train at low altitudes

Fix - Lower deck? Other controls?

Can’t Fix- Risk Decision

Training Realism Assessment (Cont.)

- Eliminate Unnecessary Training Restrictions
- Identify Necessary Differences Between Training and Combat Procedures and Reduce Their Impact
- ID Risk Controls That Apply to Combat and those which are “training only”

Class Exercises

- In-depth Tools Exercise
- In-depth Hazard Analysis Exerci
- Specific Applications Exercise

Risk Management Comparison

- **ORM Process**
  - Identify Hazards
  - Assess Hazards
  - Make Risk Decisions
  - Implement Controls
  - Supervise
- **The Scientific Method**
  - Define the Problem
  - Gather Data
  - Formulate Hypothesis
  - Test Hypothesis
  - Revise as Necessary

ORM

Process ...

NOT Program

Organizational Culture

"The way we do things here"

* Fundamental building blocks
* Group values and standards
* Medium for growth
* Shaped by leadership

Drives Key Decisions

Implementing ORM in Your Command

- Incorporate Risk Management in Decision Making at All Levels
- Operational Risk Management Makes Everyone a Risk Manager

Unit Implementation

- ORM Training at Indoc, GMT, professional training
- Command ORM Policy
- Regular use of Time-critical ORM during briefs, daily
- Regular use of Deliberate or In-depth ORM to review instructions, SOPs or problem areas
- Use of Deliberate or In-depth ORM when planning new or unusual operations
- ORM addressed at qualification boards

Staff Implementation

- Unit Implementation Plus:
- Use of Time-critical ORM during crisis action planni
- Use of Deliberate or In-depth ORM during exercise a
  operational planning
- Working group application of ORM during draft/revi
  force SOPs, instructions
- Commander requires risk assessment and controls a
  decision briefs
- Commander’s intent includes level of acceptable risk

ORM in Action

Unit Level

HCS-4/5 - Mission RA

USS STOUT - Routine tasks

VF-143 - IRA Surveys

HSL-44 - RAT

VX-1 - RDT&E

USS Eisenhower - Briefs

Staff Level

NAVSPECWARCOM - Mission Planning/Briefing Range Safety SOP

CPW-10 - Safety Stand down

MAG-13 - Automated Flight RA Program

CVWR-20 - Deployment Prep

GW Battle Group - Sister Ship Hazard ID

COMSECONDFLT - ORM at the JTF level

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Staff Level CONT.

CTW-1/6

T-2 Flight Operations

NIMITZ Battle Group

72-Hour Continous Flight Operations

ORM Implementation Concept

- Naval Aviation Leads The Way!
- Leverage the Army's Investment in ORM
- PHASE I: JUMP START for Operational Units
- PHASE II: CNATRA/FRS/FWS Pipeline Training
- PHASE III: CNET Pipeline Training

ORM - Implementation Plan

- PHASE I: Jump Start for Operation

  - Naval Safety Center “Train the Trainer” Course

  - Senior Leader Training

  - Squadron Workshop Training

ORM - Implementation Plan

- PHASE II: Long Term CNATRA - FRS - Pipeline Training

  - VT/HT Flight Instructor (user/adv)
  - Student API (indoc) and VT/HT (user)
  - FRS (user)
  - FWS/Type Wing (adv)
  - PCO/PXO ASC course (leader)
  - Follow-on Train the Trainer School (adv/TtT)

ORM - Implementation Plan

- PHASE III: CNET Pipeline Training

  - Leadership Continuum (appropriate to seniorit
  - Aviation ‘A’ Schools (indoc)
  - NAMTRAGRU (user)
  - Aviation Safety Specialist Course (advanced)

Proposed ORM Training S

LEVELS OF TRAINING

INDOC (E-1/3, O-1/2)	**CNATRA (AI/AOCS/VT PRI)** CNET (A School) NAMTRAGRU **Unit (INDOC/GMT)**
USER (E-4/7, O-2/3)	Leadership Continuum **CNATRA (VT/HT INT)*** NSC Survey Teams **FRS*** **UNIT***
ADVANCED (E-7/O-4 and above)	Leadership Continuum **FWS/Type Wing*** **TYCOM Trainers*** ASO/ASC/AVN Safety Specialist

* Application specific

Operational Risk Management

- Improves Mission Effectivene
- Reduces Mishaps

Implementation depends on